



INFECTION PREVENTION IN LONG TERM CARE

Multidrug Resistant Organisms

Massachusetts Department of Public Health

DISEASE OVERVIEW

Multidrug resistant organisms (MDROs) are not limited to hospitals. MDROs, such as methicillin resistant *Staph aureus* (MRSA), vancomycin-resistant enterococci (VRE), drug resistant *Streptococcus pneumoniae*, and multidrug resistant gram-negative bacteria are important causes of colonization and infection in long term care facilities (LTCFs).

In LTCFs, residents may be colonized with MDROs on transfer from acute-care hospitals or other healthcare facilities. Colonized residents are a concern for LTCFs because they can introduce new organisms that can go on to cause infections; infections that are costly to treat. Once MDROs, such as MRSA and VRE, have become established in a facility, they are rarely eliminated. Effective infection control policies and procedures are essential to prevent the transmission of MDROs, but application of hospital infection control guidelines to LTCFs is often difficult, if not unrealistic. The facility is the resident's home and every effort must be made to allow residents to ambulate, socialize and participate in group activities. Since many residents interact freely with each other, controlling transmission is challenging and the psychosocial needs of the residents must be balanced with good infection control practices.

Colonization and Infection

In order to implement infection control measures to prevent the spread of MDROs in LTCFs, it is important for healthcare workers to understand the difference between colonization and infection.

- **Colonization:** MDRO is present in or on a body site; no clinical signs or symptoms of illness or infection are present. A colonized person is sometimes referred to as a "carrier".
- **Infection:** Presence of an MDRO in a body site accompanied by clinical signs and symptoms of infection (e.g., fever, lesions, wound drainage) or laboratory evidence of infection. Infection usually warrants treatment.

Note: *Infection or colonization with an MDRO is not valid grounds for denial of admission to a long term care facility.*

Infectious Agents:

MDROs are defined as microorganisms, predominantly bacteria, that are resistant to one or more classes of antimicrobial agents. Although the names of some of the MDROs describe resistance to only one agent (e.g. MRSA, VRE, VISA, VRSA), these pathogens are frequently resistant to many available antimicrobial agents.

MRSA (methicillin resistant *S. aureus*) is a *S. aureus* ("staph") bacterium that is resistant to beta- lactam antibiotics, including methicillin, oxacillin, penicillin and amoxicillin. It is often resistant to many other antibiotics as well.

VRE (vancomycin resistant enterococcus) is a bacterium with resistance to vancomycin.

VISA (vancomycin intermediate *S. aureus*) **and VRSA** (vancomycin resistant *S. aureus*) are strains of *S. aureus* that are resistant to most antibiotics, including having intermediate or greater resistance to vancomycin.

Beta-lactamases are enzymes produced by certain gram-negative and gram-positive bacteria such as *Staph aureus*, *Klebsiella pneumoniae* and *Escherichia coli*. These beta-lactamases disrupt the actions of certain antibiotics, such as penicillin, ampicillin and cephalosporins, making them ineffective. Later cephalosporins, i.e. extended spectrum cephalosporins, were originally resistant to the actions of many beta-lactamases and, therefore, effective against many bacteria. In the mid-1980's, however, new types of beta-lactamase were identified as being produced by *K. pneumoniae* and *E. coli* that could render these newer antibiotics ineffective. The organisms that produce these "extended spectrum beta-lactamases" are collectively called **ESBLs**.

CRE (carbapenem resistant Enterobacteriaceae) are gram-negative bacteria, such as *Escherichia coli*, *Klebsiella* spp., and *Enterobacter* spp. that are resistant to one or more carbapenem antibiotics (imipenem, meropenem, doripenem, and/or ertapenem). Some of these bacteria can also produce an enzyme called a carbapenemase (e.g., KPC, NDM, VIM, IMP, OXA-48) that disrupt the action of carbapenems and other beta-lactam antibiotics. These are highly resistant organisms that require strict infection control measures.

In addition to the MDROs above, there are other multi-drug resistant organisms, such as strains of *Streptococcus pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Stenotrophomonas maltophilia*, and certainly more to come that can and will be of concern.

Reservoir: Colonized and infected patients serve as the major reservoir of MDROs in LTCFs. Some U.S. facilities have reported rates of colonization with MRSA as high as 30%. Colonization with MDROs may be transient or persistent, at a single site or multiple body sites. The nose (anterior nares) is the most common site of colonization with MRSA and other staph in both residents and healthcare providers. VRE and CRE typically colonize the bowel, skin and wounds.

Other frequent sites of colonization with MDROs include the axilla, perineum, wounds, tracheostomy sites and venous catheter exit sites. In LTCF residents, MRSA is commonly isolated from urinary catheters and gastrostomy tube exit sites.

Mode of Transmission: MDROs are primarily transmitted from patient to patient via the hands of healthcare workers. Hands may become contaminated by contact with: a) colonized or infected patients; b) colonized or infected body sites of the personnel themselves; or c) devices, items, or environmental surfaces contaminated with these organisms. Cleaning and disinfection of patient care items and environmental surfaces are essential to reduce bacterial load and risk of transmission. Droplet transmission is less common but may be important in patients with tracheostomies who are not able to control their secretions.

Incubation Period: Variable and dependent on the MDRO.

Risk factors for colonization, infection and transmission of MDROs in LTCFs:

- Antibiotic use
- Medical device use
- Length of stay
- Elderly and disabled residents
- Accommodation in room with multiple beds

Both colonized and infected residents may serve as sources for spread of MDROs in LTCFs. Since colonization may persist for long periods of time, LTCFs can expect infections with MDROs to be a continuing problem.

Diagnosis and testing: Colonization/infection with an MDRO is identified by bacterial culture, antibiotic susceptibility testing, and other specific laboratory tests, along with clinical signs/symptoms. The site for culture will depend on the particular MDRO and the signs and symptoms that the patient is exhibiting. For example, common sites of infection (and colonization) for MRSA, VISA and VRSA include wounds, tracheostomy sites, respiratory tract of intubated patients, and IV catheter sites. To detect colonization in the asymptomatic resident or health care worker, specimens are usually obtained from the skin, nares or rectum. To detect colonization with CRE in the asymptomatic resident or health care worker; stool, rectal, or peri-rectal cultures and sometimes cultures of skin sites, wounds or urine (if a urinary catheter is present) are obtained.

Treatment: Issues related to the treatment of infection or colonization with an MDRO, including whether and what antibiotics are appropriate, should be addressed by the patient's physician. The occurrence and persistence of MDROs in LTCFs has been strongly associated with antibiotic use. A common problem is the failure to distinguish infection from colonization and the unnecessary treatment of colonization with antibiotics.

INFECTION CONTROL AND PREVENTION

There are several interventions used to control the spread of MDROs in LTCFs. These include administrative measures, education, surveillance, infection control, environmental measures, judicious antibiotic use (also referred to as "Antibiotic Stewardship"), decolonization, communication and outbreak control.

Administrative Measures

Authorities in infection prevention have strongly recommended administrative support and involvement in efforts to control MDROs in LTCFs. Interventions, such as providing the necessary number and appropriate placements of handwashing sinks and hand sanitizer dispensers, maintaining appropriate staffing levels and enforcing adherence to recommended infection control practices all require the involvement and support of administration.

Surveillance

Surveillance is an important component of all infection control programs. Surveillance should include confidential line listing of residents colonized and/or infected with targeted MDROs.

Monitoring culture and antibiotic susceptibility data will help determine baseline rates for MDROs in a facility, indicate the occurrence of increased transmission, and monitor the effectiveness of outbreak

control measures. In some health care settings, it may be appropriate to use active surveillance cultures to identify patients who are colonized with a targeted MDRO, but this would rarely be the case in a LTCF.

Antibiotic Use and Antibiotic Stewardship

The appropriate and prudent use of antimicrobials is a key component in controlling antibiotic resistance. LTCFs should develop and institute programs and policies to monitor and control the use of antimicrobials. The CDC's [*Core Elements of Antibiotic Stewardship for Nursing Homes*](#) provides guidance for judicious use of antimicrobials and tools for implementation. This website contains many resources for long term care and focuses on effective antimicrobial treatment of infections, use of narrow spectrum agents, avoiding excessive duration of therapy and restricting use of more potent antibiotics to the treatment of serious infections.

Infection Control Measures

Implementation of, and adherence to, infection control practices are key to preventing the transmission of infectious diseases in all healthcare facilities.

Standard Precautions should be used consistently and at **all** times, by all staff, in LTCFs. Most residents with MDROs can be cared for using Standard Precautions, with an emphasis on strict adherence to hand hygiene and appropriate glove use. General infection control measures, including Standard Precautions for healthcare providers can be found at: <http://www.mass.gov/eohhs/docs/dph/cdc/infection-control/general-measures.pdf>

Contact Precautions may be indicated for residents with MDROs. Consider the resident's individual clinical situation and the prevalence or incidence of the particular MDRO in the facility when deciding whether to implement Contact Precautions for a resident infected or colonized with an MDRO.

- Healthy residents: For relatively healthy and mainly independent residents, follow *Standard Precautions*, making sure that gloves and gowns are used for contact with uncontrolled secretions, pressure ulcers, draining wounds, stool incontinence, urinary catheters, and ostomy tubes/bags.
- Ill residents: For those residents who are ill, or totally dependent upon healthcare personnel for healthcare activities of daily living, or ventilator-dependent, and for those residents whose infected secretions or drainage cannot be contained, use *Contact Precautions* in addition to *Standard Precautions*.

There is currently no definitive data to support the decision about when to **discontinue contact precautions**; however, the resident's risk of transmission to others (e.g., overall health, dependence on healthcare, and device use) can be considered. In most cases, the absence of active wound drainage, diarrhea and copious contaminated secretions greatly reduces the risk presented by an infected or colonized individual. It is important to note that a single negative culture may not be enough to declare a resident "cleared" of CRE, as intermittent shedding has been documented. For more information regarding the control of CREs, see [*Facility Guidance for Control of Carbapenem-Resistant Enterobacteriaceae \(CRE\). 2015.PDF*](#) (381KB/24 pages).

Room Placement: In LTCFs, decisions regarding patient placement should be made on a case-by-case basis, balancing infection risks for other patients in the room, the presence of risk factors that increase the likelihood of transmission, and the potential adverse psychological impact on the infected or colonized patient.

- A single patient room is preferred for patients who require Contact Precautions. If single rooms are not available, consultation with infection control personnel is recommended to decide which residents with MDROs can be cohorted. If cohorting is not possible, residents colonized or infected with MDROs should not be placed with roommates who are severely immunocompromised or have indwelling lines or open wounds.
- In multi-patient rooms, >3 feet spatial separation between beds is advised to reduce the opportunities for inadvertent sharing of items between the infected/colonized patient and other patients. Draw the privacy curtain between beds to minimize opportunities for direct contact.
- Change protective attire and perform hand hygiene between contact with patients in the same room, regardless of whether one or both patients are on Contact Precautions.

Group Activities: MDRO colonized or infected residents should be allowed to ambulate, socialize as usual, and participate in therapeutic and group activities as long as contaminated body substances are contained. Hand hygiene is an important component of participation in group activities. When residents leave their room, they should have their hands cleaned. In addition, they should have clean, dry dressings and wear clean clothes. Where appropriate, enhanced barrier protection to contain a contaminated body substance is preferred over restriction of the resident.

Hand Hygiene: **Handwashing is the single most effective measure to prevent the spread of MDROs.** Strict adherence to hand hygiene protocols must be maintained. Hand hygiene should be performed:

- After touching blood, body fluids, secretions, excretions, and contaminated items.
- Immediately after gloves are removed, between patient contacts, and when otherwise indicated to avoid transfer of microorganisms to other patients or environments.
- When hands are visibly soiled with blood or other body fluids.

Both staff and visitors should wash their hands with soap and water after patient care, and prior to leaving the room of a MDRO-positive resident. Hands should be dried with a dry, disposable

paper towel, and faucets should be turned off using a paper towel. **The use of a waterless, alcohol-based hand antiseptic is as effective as soap and water for MDROs in most cases, is not harmful to hands, and may improve compliance.** However, these products are not a substitute for handwashing in the event of visible contamination.

Gloves: **Don gloves upon entry into the room or cubicle.** Gloves (clean non-sterile gloves are adequate) should be worn when providing care that involves substantial personal contact (e.g. changing clothes, toileting, bathing) or contact with items that may be contaminated by an MDRO (e.g. bedding). If, during the course of patient care, gloves become soiled with potentially infectious material (e.g. urine, stool), they should be changed before further contact with clean surfaces, the patient, or other staff. Remove the gloves after caring for the patient and wash hands with soap and water or use an alcohol based hand sanitizer before leaving the room. Gloves alone do not guarantee prevention of transmission. Never wash gloves for the purpose of reuse.

Gowns: **Don gown upon entry into the room or cubicle.** Remove gown and perform hand hygiene before leaving the patient-care environment. After gown removal, ensure that clothing and skin do not contact potentially contaminated environmental surfaces that could result in possible transfer of microorganisms to other patients or environmental surfaces.

Masks and Eye Protection: Eye protection or face shields should be worn during the care of **any** resident as part of Standard Precautions when performing procedures and patient-care activities that are likely to generate splashes or sprays of blood, body fluids, secretions and excretions. Such activities include wound irrigation, oral suctioning, intubation, and caring for a resident with open tracheostomy. You may also want to consider wearing masks and eye protection while caring for residents with respiratory infections. Masks and eye protection are not otherwise recommended for prevention of MDRO transmission from residents to health care workers during routine care.

Patient care equipment and instruments/devices: Use disposable noncritical patient-care equipment (e.g., blood pressure cuffs) or implement patient-dedicated use of such equipment. If common use of equipment for multiple patients is unavoidable, clean and disinfect such equipment before use on another patient. Clean and disinfect surfaces that are likely to be contaminated with an MDRO, including those that are in close proximity to the patient (e.g., bed rails, over bed tables) and frequently-touched surfaces in the patient care environment (e.g., door knobs, surfaces in and surrounding toilets in patients' rooms) on a more frequent schedule compared to that for other surfaces.

Environmental Measures

Monitoring for adherence to environmental cleaning practices is an important component for controlling the transmission of all pathogens, including MDROs in LTCFs. Standard facility procedures should be followed for cleaning the rooms of residents with MDROs. Prioritize room cleaning of patients on Contact Precautions. Bath tubs, whirlpools, and hydrotherapy tubs should be cleaned and disinfected after each use. Always consult your facility's housekeeping protocols first. There are several disinfectant products on the market. However, only those that

are registered by the Environmental Protection Agency (EPA) as a hospital-grade disinfectant should be used. A list of EPA registered disinfectants may be obtained by calling the National Pesticide Information Center at 800-858-7378 or by visiting <http://www.epa.gov/oppad001/chemregindex.htm>

Solutions of 5.25% sodium hypochlorite (household bleach) diluted to 1:64 with water (1/4 cup bleach to one gallon of water) are also acceptable for disinfection of environmental surfaces. Keep in mind, however, that bleach solutions can cause irritation of the skin, eyes, nose and respiratory system, and must be handled with care for the protection of staff and patients. Avoid direct contact with skin and eyes and prepare bleach solutions in a well-ventilated area. Bleach solutions need to be prepared daily.

Minimal handling of soiled **linens** should be stressed. Staff involved with stripping beds or otherwise having direct contact with these materials should wear gloves and gowns. Soiled linens should be bagged in the resident's room.

Decolonization

Decolonization is sometimes considered to eliminate carriage of MRSA. This may decrease the risk of

transmission to high-risk individuals or to others during an outbreak situation. While this approach has been used in a number of hospitals and LTCFs, it can result in increased antibiotic resistance. The effectiveness of decolonization is questionable and the ***routine culturing and decolonization of residents and staff for MRSA is not recommended.***

Measures to eradicate MRSA colonization have included the use of topical and/or oral antibiotic treatments and the use of antibacterial soaps.

Special circumstances and medical reasons may warrant an attempt to decolonize residents or staff. They include the following:

- During a MRSA outbreak, decolonization of residents and staff may be used to control the spread of the organism.
- Staff implicated in transmission of MRSA are candidates for decolonization and should be treated and culture negative before being allowed to return to direct patient care.
- Residents who are immunocompromised and colonized, and therefore are more likely to develop serious infections, should be considered for decolonization.
- Residents who are more likely to spread the organism due to behavior (i.e. developmentally disabled or confused) or poor personal hygiene can also be considered for decolonization.

Any decision to decolonize should be made by an individual's physician or after consultation with an infectious disease expert.

Note: Regimens and efficacy of decolonization protocols for MDROs other than MRSA, e.g. VRE and CRE, have not been established.

Education

Staff: All staff working in a LTCF should receive education and training regarding MDROs and the importance of control. Education should be provided on a regular basis, at least annually. Additionally, in-service training in infection control should be provided in response to any increase in MDRO frequency within the facility. When educating staff about MDROs it should be reinforced that although healthcare workers are at risk for colonization, healthy people are at very little risk for developing an **infection** with an MDRO.

Resident, Family and Visitor: Residents and their families and visitors should be educated about MDROs and the rationale for the types of precautions used by the LTCF. Families and visitors must understand the importance of hand hygiene and should clean their hands before entering and leaving the room of a resident. In addition, families and visitors must have education to alleviate their concerns about MDROs, ensure that precautions are maintained, and understand that residents with MDROs do not need to be avoided.

Communication with other Facilities

It is essential that LTCFs, hospitals and other healthcare organizations (e.g. home health care and VNAs) work together to control the spread of MDROs. Effective communication will ensure that the MDRO status of residents is known so that appropriate precautions are implemented in all healthcare settings. Identification of MDRO colonization/infection should be noted in the resident's medical record, and notification should be given prior to transfer/travel to another facility. Examples of transfer forms can

be found here: http://www.cdc.gov/HAI/prevent/prevention_tools.html.

Outbreak Control

An outbreak may be defined as the occurrence of a disease or condition in excess of what is normally expected. The common definition of an outbreak in LTCFs is: 1) several cases that are linked epidemiologically by person, time, or place, or 2) a substantial increase in the number of cases normally identified in a facility. Each case of an MDRO in a resident should be closely monitored as previously described. In addition, the following should be conducted in **outbreak** situations:

1. Reinforce infection control procedures throughout the facility as described above. Institute Contact Precautions for residents who are positive for the outbreak MDRO.
2. Establish a cohort of residents who are positive for the outbreak MDRO. Staff should be restricted to caring for only one cohort of residents. Restrict floating of staff.
3. Most often, environmental reservoirs of pathogens during outbreaks are related to a failure to follow recommended cleaning and disinfection procedures rather than the specific cleaning and disinfection product used. Intensify and reinforce education of housekeeping staff.
4. Some facilities choose to assign designated staff to targeted resident care areas. Monitor cleaning performance to ensure compliance with disinfection of surfaces closest to the infected resident.
5. Culture all residents in the affected units. Consult expert opinion regarding the best culture sites for surveillance of the particular MDRO. Obtain cultures from staff when there is epidemiologic evidence that might implicate a staff member as a source of ongoing transmission.
6. Collect the following information for each resident (case) positive for the outbreak MDRO:
 - a. location in the facility (before and after cohorting)
 - b. date(s) of the original and most recent admissions to the facility
 - c. date(s) of recent admissions/discharges to/from other acute and LTCFs
 - d. list of caregivers in the current facility who had "hands-on" contact
 - e. body site(s) of infection/colonization
 - f. age, sex, and ethnicity
 - g. diagnosis and underlying conditions
 - h. treatments given
7. As previously mentioned, decolonization of residents or staff is **not** routinely recommended. This has not proven to be an effective control measure for large populations because recolonization occurs. However, in an outbreak situation, when the MDRO is MRSA, if evidence implicates a colonized staff member or resident as a source of ongoing transmission then s/he **should** be removed from work while efforts are made to achieve decolonization (with infection control consultation). For specific information regarding decolonization see [*Management of Multidrug-Resistant Organisms in Healthcare Settings, 2006*](#) PDF (234KB/74 pages).

8. Depending on the extent of the outbreak and the MDRO involved, restricting admissions to the facility may be considered while the outbreak is on-going.

REPORTING RESPONSIBILITIES

Outbreaks should be reported to the Division of Health Care Safety and Quality at (617) 753-8150 during normal business hours and (617) 363-0755 after normal business hours. For further information or assistance with control measures, call the Division of Epidemiology and Immunization at (617) 983-6800.

Information about reportable diseases to the Massachusetts Department of Public Health can be found here:

<http://www.mass.gov/eohhs/gov/departments/dph/programs/id/epidemiology/rdiq/reporting-diseases-and-surveillance-information.html>

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